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IV. *Extract of a Letter from Mr. George Witchell, F. R. S. and Master of the Royal Academy at Portsmouth, to Charles Morton, M. D. Sec. R. S. inclosing some Account of a Solar Eclipse observed at George's Island, by Captain Wallis; and several Astronomical Observations made at Portsmouth.*

To Cha. Morton, Sec. R. S. &c.

S I R,

Read Feb. 13, 1771. **I** Beg the favour of you to lay before the Royal Society, an extract of a letter to me from Captain Wallis, containing an observation of a solar eclipse, which happened during his stay at George's Island, from which I have calculated the difference of meridians between that place and Greenwich.

To this I have subjoined some astronomical observations, which have been made here by Mr. Bradley and myself, both before and since the building of the Observatory belonging to the Academy; which, if they should prove acceptable to the Royal Society, will induce us to take every opportunity of

continuing to transmit them, as we shall always esteem it a peculiar happiness to be able to contribute any thing, that may be deemed worthy of their notice.

I am, S I R,

Your most obedient,

humble servant,

Royal Academy, Portsmouth,
August 9, 1771.

G. Witchell.

Extract of a Letter from Captain Wallis,
June 20th, 1771.

——— “ Saturday, July 25th, 1767, being at
“ anchor in his Majesty’s ship Dolphin in harbour,
“ went on shore on a low point of land, not above
“ four feet higher than the sea, and observed an
“ eclipse of the Sun, as below. Latitude, by the
“ mean of many observations, $17^{\circ} 30'$ South, lon-
“ gitude, by various observations of the distance of
“ the Sun from the Moon, between $149^{\circ} 30'$ and
“ $149^{\circ} 50'$ West from London.

“ By

				h	'	"				h	'	"			
" By the master's watch at	7	6	0	}	A. M. the ☉'s altitude was 8° 43' on the quadrant,				}	7	5	20			
" By my watch at . .	7	3	20		without any correction.					Hence the app. time					
" By the master's watch at	8	13	0	}	A. M. the ☉'s altitude was 22° 52' on the quadrant,				}	8	12	12			
" By my watch at . .	8	10	12		without any correction.					Hence the app. time					
					h	"	"				h	'	'		
" The eclipse began, by the master's watch, at	.	.	.	}	6	52	30	}	A. M. Apparent time,		6	51	50		
" By my watch, at		6	49	50								
" The end of the eclipse, by the master's watch, at	8	1	48	}	A. M.		}			8	1	0			
" By my watch, at	7	59	0												
											" Duration		1	9	10
" We were not certain of the instant of the beginning of the eclipse, from a little negligence ; but															
" very certain of the end."															

R E M A R K.

As the Sun's altitudes are given, without any correction, I suppose they were taken by bringing down the image of the Sun, till it appeared bisected by the visible horizon : I have therefore recomputed the time, by allowing for the dip and refraction, which, together, amount to 8'. This correction makes the apparent time of the beginning 6^h 51' 12'', and the end 8^h 0' 37'' ; hence the duration of the eclipse was 1^h 9' 25'' ; but, by a careful computation from Mayer's new Tables, the duration should have been 1^h 13' 20''½, which is almost about 4' longer than the observation affords ; but, as it is remarked that the beginning was not exactly taken, and the Moon entering very obliquely on the Sun, the defect in 4' would be but little. It seems most reasonable to attribute the whole of the error to the beginning of the eclipse. I have therefore deduced the longitude from the end, and

make it to be $9^h 55' 55''$ West from Greenwich, or $148^\circ 58' \frac{1}{4}$, which is $41' \frac{1}{2}$ less than the mean result of the lunar observations, which, considering all circumstances, is not, in my opinion, a very great difference for the first observations that were ever made upon this island.

Astronomical Observations made at the Royal Academy, Portsmouth.

1769. May 9th, at $8^h 13' 9''$; apparent time, Mr. Bradley observed the immersion of ζ Π^{orum} by the Moon, uncertain to a few minutes, on account of the strong twilight. The emersion was not taken.

The transit of Venus, and solar eclipse, next morning, were both observed here; but, having then no better instrument for determining the going of the clock, than an indifferent Hadley's sextant, I do not think the observations worthy of being laid before the Society; and, for the same reason, omit the observations of the comet.

1770. April 7th, at $11^h 23' 33''$; apparent time, by Mr. Bradley's observation, the Moon occulted ϵ Ω^{is} . My time was within $2''$ or $3''$ the same; but we did not observe the emersion. This occultation was observed both at Greenwich, by Mr. Maskelyne, and at Oxford, by Professor Hornsby; by comparing which, it appears that this place is West of Greenwich $4' 24'' \frac{1}{2}$ of time, and that Oxford is West of Greenwich $4' 58'' \frac{1}{2}$.

1770. April 28, at $9^h 48' 13''$, apparent time, Mr. Bradley and I, both at the same instant, observed the immersion of $\zeta \delta^i$ by the Moon. The emergence was not taken. By comparing this with Mr. Maskelyne's observation, our longitude comes out $4' 23''\frac{1}{2}$ West from Greenwich.

1775. July 21st is marked for an eclipse of Jupiter's fourth satellite in the Nautical Almanac; but the *Connoissance des Temps* notes it as a conjunction only, and remarks, that the satellite would raise the shadow, without disappearing; which we found to be true, for we both saw the satellite the whole time which is marked for its duration, though, at the middle, it appeared extremely faint.

These observations were made before our Observatory was finished; but that being completed in the month of September, and furnished with an excellent (though small) mural quadrant and transit instrument, both made by that eminent artist Mr. John Bird, we began to observe meridian transits, from which I shall select those that were made for determining the solstices, and the oppositions of the three superiour planets, which I shall transcribe, just as they were taken, excepting only making the necessary allowance for the error of the line of collimation...

Observations for determining the Solstices.

		App. zen. dist. of the ☉'s V.L.			App. zen. dist. of the ☉'s L.L.			Baro- meter.	Thermo- meter.	Hence the app. zen. dist. of the Sun's center.		
		o	'	"	o	'	"			o	'	"
1770.	Dec. 9.	73	21	40.3	73	54	5.1	29.76	37	73	37	52.7
	12.	73	36	41.8	74	9	25.0	29.78	46	73	53	3.4
	14.	73	44	22.0	74	16	58.2	29.87	44+	74	0	40.1
	21.	73	56	41.0	74	29	13.1	29.37	43+	74	12	57.0
	22.	73	56	20.0	74	29	8.1	29.94	38½	74	12	44.0
	29.	73	42	27.2	74	15	0.4	29.62	48½	73	58	43.8
1771.	Jan. 3.	73	18	18.0	73	51	3.6	29.23	46	73	34	40.8
<hr/>												
1771.	June 18.	27	5	45.4	27	37	42.2	29.82	64+	27	21	43.8
	19.	27	4	52.7	27	36	32.1	30.03	66½	27	20	42.4
	20	27	3	52.0	27	35	44.4	30.11	71+	27	19	48.2
	21.	27	3	33.6	27	35	26.0	30.12	70	27	19	29.8
	22.	27	3	51.0	27	35	29.4	30.11	67½	27	19	40.2
	24.	27	5	17.1	27	37	3.5	30.06	67	27	21	10.3
	25.	27	6	43.2	27	38	32.0	30.04	72½	27	22	37.6

By comparing these observations together, I make the
 true zenith distance of the Sun's center, at the }
 Winter Solstice, to be } 74 16 13.4
 And at the Summer Solstice } 27 19 51.6

Therefore, the distance of the tropics 46 56 21.8
 Half 23 28 10.9

By Mr. Mayer's Tables, the decrement of the obli- }
 quity, in three months, is } 0.1

Hence the mean obliquity, December 21, 1770 23 28 11.0
 And June 21, 1771 23 28 10.8

Therefore, the latitude of the Observatory, by these }
 observations, is } 50 48 2.4 North.

The above observations were chiefly taken by Mr. Bradley. Those which follow are what I took about the time of the late oppositions of the superior planets, in which, as well as the preceding observations, the apparent zenith distances are those which were taken by the 6th arc, on which we chiefly depend, though the difference between the two arcs seldom arises to more than three or four seconds.

For

For the Opposition of the ☿ and ♂.

Days.	Time per clock.			Meridian Transits.	App. zen. dist.			Barom.	Therm.
	h	'	"		°	'	"		
1770. Dec. 10.	5	18	58½	β Leporis passed the middle wire.					
		20	51—	δ Orionis.					
		36	49—	Mars	24	41	6.0	29.87	28½
		43	19	α Orionis.					
13.	5	12	24—	β Tauri.					
		31	35	Mars	24	38	11.4	29.76	42½
		43	21+	α Orionis.					
	6	1	37	γ Geminorum.					
16.	5	26	22½	Mars	24	36	55.5	29.80	47½
		43	21	α Orionis.					
17.	5	12	24½	β Tauri.					
		24	40	Mars	24	36	15.6	29.91	43
		43	21	α Orionis.					
20.	5	4	7—	Rigel.					
		19	40:	Mars	24	36	25.6	29.16	43
		37	29+	α Orionis.					

For the Opposition of the ♄ and ♃.

Days.	Time per clock.			Meridian Transits.	App. zen. dist.			Barom.	Therm.
	h	'	"		°	'	"		
1771. Febr. 1.	9	1	51+	Saturn passed the middle wire.	32	48	20.8	29.89	42
		16	26—	α Hydræ.					
2.	9	1	32	Saturn	32	46	53.4	30.07	42+
		16	26½	α Hydræ.					
7.	8	32	58+	ε Leonis.					
		59	57½	Saturn	32	39	27.6	30.04	28
		9	29	δ Leonis.					
10.	8	59	1½	Saturn	32	35	9.5	29.72	18½
		9	16	α Hydræ.					
		29	5+	δ Leonis.					

[40]

For the Opposition of ☉ and ♃.

	Time per clock.	Meridian Transits.	App. zen. dis.	Barom.	Therm.
Days.	h ' "		o ' "		
1771. July 12.	16 15 41 18 0 21½ 9 44— 14 7½ 19 39 8½	Antares passed the middle wire. μ Sagittarii. γ Serpentis. λ Sagittarii. Jupiter			
13.	7 28 52½ 31 8+ 19 38 34	☉'s preceding limb. ☉'s following limb. Jupiter	72 40 43.8	29.87	57½
14.	7 32 53 35 10+ 19 37 59	☉'s preceding limb. ☉'s following limb. Jupiter	72 41 52.5	30.18	57+
15.	7 36 55 39 12 16 45 35+ 19 37 23	☉'s preceding limb. ☉'s following limb. Antares. Jupiter	72 44 57.1	30.12	59
17.	7 44 56— 47 12+ 16 15 31 19 36 14½	☉'s preceding limb. ☉'s following limb. Antares. Jupiter	72 47 50.7	29.92	65
23.	8 8 46 11 0½ 16 15 19½ 19 32 48	☉'s preceding limb. ☉'s following limb. Antares. Jupiter	72 55 47.3	30.21	60½

An Occultation of λ Libræ by the Moon.

	App. time.	
Day.	h ' "	
1771. April 2, at	13 7 9½	λ Libræ emerged from the Moon's limb. Mr. Bradley makes the time 3" later. The immersion was not taken.

The Moon's Passage over the meridian, near the ϕ .

	Time per clock.	Meridian Transits.	App. zen. dist. of the δ .	Barom.	Therm.
Day.	h ' "		° ' "		
1771. April 28.	2 19 54	Sun's preceding limb passed the second wire		29.74	44
	24 4	Sun's following limb passed the fourth wire			
	14 17 23+	Moon's preceding limb passed the middle wire	Upper limb 66 13 13.9		
	19 40+	Moon's following limb	Lower limb 66 45 48.1		

It being very clear this evening, when the Moon passed the meridian, we were in hopes of getting a good observation of the lunar eclipse, which happened soon after ; but the air did not long continue in that state, but became so hazy, that we could not get any certain observations.